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ABSTRACT

This paper is an attempt to pose some of the issues of organizational policy facing the university and its suppcrting agencies as it attempts to meet the problems of contemporary society, particularly as these problems focus on educational research and research training and demand interdisciplinarity in the process of their solution. Any definition of interdisciplinarity leads to a transdisciplinary model that necessitates an integration of some structure of goals with a system for integrating participating disciplines. If any such transdisciplinary innovation within the university is to be successful, it necessitates certain operational assumptions that include philosophical and budgetary commitment at the highest level of university administration. Four organizational patterns are cften employed in the establishment of interdisciplinarity at the university, one of which is the institute or center. The institute is seen as the most creative organizational structure for the innovative development cf transdisciplinarity in the university. (HS)

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ORGANIZATIONAL POLICY ISSUES AFFECTING INTERDISCIPLINARY EDUCATIONAL RESEARCH AND RESEARCH TRAINING

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> The American colleges and universities, in their development from simple institutions to complex organizations, not only replaced the old-time professor with the academician, that trained specialist who knew the rights and privileges and responsibilities of a profession and who in so many of his experiences was indistinguishable from other organization men, but the colleges and universitites also required a new kind of executive officer, new methods of financing, new areas of administration. Growth fed upon growth, and the answer to the problems of growth--unless it was to be chaos--was organization.[1]

...and organization has continued to feed upon organization, so that the answer to the resulting problems of lack of flexibility and social sensitivity--unless it is to be irrelevance--is increased interaction among the disciplines.

The challenge before the humanistic sciences has never been greater than it is at the present time. As our technology outstrips our slowly developing knowledge of ourselves, the magnitude of human difficulties within our own culture and throughout the world continues to increase. An acceleration in the development of social knowledge, particularly that relating to education, is imperative. Further, this research effort must have immediate social relevance. The time is past when human science can tolerate a strong molecular bias in its approaches to the study of man. This is not to minimize the importance of this type of basic research, but the Zeitgeist has shifted to the complementary synthesis of knowledge sometimes referred to as the "ecological" approach.

1 Rudolph, Frederick, The American College and University A History, Random House, 1962, page 417

Accelerated technical change has brought about an ever widening interpretation of what constitutes educational research. Behavior relevant to contemporary education involves a complex system of concepts identified with many disciplines. The result has been the significant and important overlapping of education with other areas of human science. If educational research is to gain leverage on contemporary social problems, therefore, it will need to take on an increasingly interdisciplinary bias.

Conceptualizing interdisciplinary research, however, is not enough. Critical policy and attitudinal changes must occur within higher education before any model for interdisciplinary research or training will have a chance to take root. The emphasis has tended to be on what Jantsch (1970) calls the tactical and strategic questions rather than on the role and organization of education and the university as an institution of contemporary society.

The current movement to develop models for research implementation and research training that involve multiple disciplines is regarded by many educators as crucial to the success of contemporary education research. As Randolph implies, however, the American university has developed established organization patterns that are extremely difficult to change. Considerable effort is needed in establishing a policy for change in the fabric of research

organization and research training in higher education. In so doing the question of how we expedite interdisciplinary study from an organizational as well as a conceptual point of view must be dealt with.

THE CONCEPT OF INTERDISCIPLINARITY

If a group of educators were asked to list the cliches they felt most often used in discussions of educational research, it is probable that "interdisciplinary" or "interdisciplinary research" would be on the list of many. Indeed "interdisciplinary" is a term nearly everyone uses, few understand and fewer still have first-hand knowledge about. As White (1972) recently pointed out, there is no generally accepted definition of interdisciplinary or multi-disciplinary research in present research circles. A pattern emerges, however, when one reviews various positions with regard to the concept.

Blackwell (1955) defined a continuum of research undertakings involving six alternatives based upon three dimensions. The dimensions included the number of people involved (X), the degree of interaction among researchers (Y) and the number of disciplines (Z). A description of the combinations, leaving out the impossible alternatives, results in a continuum of increasing interdisciplinarity ranging from the lone researcher working in one discipline to the team of researchers from multiple disciplines working

in interaction. A complete description of this model is provided in Appendix A.

White, on the other hand, describes four types of interdisciplinary research based primarily upon different levels of activity and degrees of interaction. He describes his views as follows:

> We can distinguish at least four types of activity which do cross the traditional boundaries. There is the "renaissance man" type of research which resides in individuals who, acting independently, manage with great illumination and insight to integrate the experience and concepts of several fields. We are favored with only a few such gifted people....
>
> Much more common is the "umbrella" type of research. Two or more individuals from different fields gather together under the protection of a symposium, an edited volume, or a grant. The results of independent work bearing on a common topic are presented with little or no intellectual teamwork. This can describe aspects of many problems but rarely leads to problem-solving.
>
> More complicated is the "federated" type of research. Two or more individuals join together to work toward an agreed goal with understanding as to the contribution which each will make but reserving to each the responsibility for conduct of the research and the character and quality of findings. This lends itself to the solution of less complex problems, and can deal with more difficult topics given sufficient time and patience.
>
> The type of research which directs itself immediately to problem-solving might be called "managed" research.... From the outset there is an explicitly stated goal and an agreement that all participating in the analysis or synthesis will direct their activities to stated parts of the investigation.[2]

The use of systems science has, perhaps more than any other process dimension, allowed for quantum leaps in the

2 Response by Gilbert F. White to presentation of the Iben Award in the Proceedings of the Eighth American Water

development of interdisciplinary approaches to social issues. In this regard the model proposed by Jantsch (1970) introduces a fourth level of disciplinary integration which he terms "transdisciplinary". For Jantsch the critical dimension delineating levels of interdisciplinary effort is the degree and level of synthesis of a system of concepts from multiple disciplines as well as the degree of coordination of acceptable goal structures inherent in each. Transdisciplinarity is a most important addition to the continuum of cross disciplinary effort as it necessitates organizational commitment and innovation, including the delineation of specific programmatic or system goals.

> The ultimate degree of coordination in the education/innovation system, finally, which is called transdisciplinarity ... would not only depend on a common axiomatics--derived from coordination toward an "overall system goal"--but also on the mutual enhancement of epistemologies in certain areas, what Ozbekhan (1970a) calls "synepistemic" cooperation. With transdisciplinarity, the whole education/innovation system would be coordinated as a multilevel multigoal system, embracing a multitude of coordinated interdisciplinary two-level systems. Transdisciplinary concepts and principles over the whole system change significantly with changes in the "overall system goals," .... For example, the adoption of a notion of "progress" at this (the) top level would imply a totally different education/innovation system from one for which "ecological balance", or a notion of cyclical development, are adopted. We arrive here at the same crossroads as in all attempts to view whole systems and aim at their improvement: we lack a deeper understanding of purpose, and thus an unambiguous direction for our organizational efforts. Nevertheless, we cannot hope to act with a true purpose--in other words, to manage the multilevel multigoal education/innovation system in a meaningful way--if we do not search for and bring into play values

> and norms, a policy for mankind, to guide education and innovation. This task is, on the one hand, an aspect of policy formation and institutional renewal --and thus part of the domain of policy sciences (Jantsch, 1970)--and on the other hand its very motor, if education and innovation are supposed to be geared to the self-renewal of society.[3]

From these conceptualizations of disciplinary interaction the following definitions are drafted for purposes of discussion:

disciplinary research -- research by one or more individuals involving a single discipline

multidisciplinary research -- group research whereby individuals from different disciplines work together on a common problem but with limited interaction

interdisciplinary research -- group research whereby individuals from different disciplines work as a team, with continual intellectual interaction and conceptual synthesis

transdisciplinary research -- group research whereby individuals from different disciplines work as a team within a mutually accepted systems organization with an overall set of systems goals.

My comments will draw further from Jantsch's paper as his remarks focus on critical policy concerns. Models of interdisciplinary effort are important, but they will fade

3 Jantsch, Erich, "Inter- and Transdisciplinary University: A Systems Approach to Education and Innovation", Policy Sciences, American Elsevier Publishing Company, Inc., 1970

quickly unless efforts are made to change the organizational structure that provides the basis for their functioning. These policy dimensions of organizational change form the proverbial "horse" that must precede the "cart" of model implementation if the critically needed integrated approach to educational problems is to be achieved.

ORGANIZATIONAL ASSUMPTIONS AND ISSUES

Unique policy, organizational and operational assumptions are necessary if any model of interdisciplinary or transdisciplinary research is to succeed within a given university community.

Commitment to Transdisciplinarity

The ability to establish an interdisciplinary research program or training effort is not enough. Commitment to these efforts at the top levels of academic administration is an even more basic necessity for the success of interdisciplinary programs. Faculty support will often be guarded initially, but if a commitment to the policy of organizational innovation is prevalent within the administration, models of interdisciplinary change will have an opportunity to prove themselves. Without such commitment, however, the traditional disciplinary biases in conjunction with the power concerns of existing departmental structures will overcome any longitudinal movement toward interdisciplinary or transdisciplinary research or research training.

Those who cry for "accountability" on the part of

higher education today give as one of their reasons the overlapping pragmatism that has pervaded postsecondary academics. The "foot in the door" approach has been employed too many times with too little concern for administrative commitment to the organizational concepts of innovation and change demanded by these experimental programs. Without longitudinal administrative commitment to the philosophical concepts of interdisciplinary and transdisciplinary organization within the university the probability is very high that any efforts at such change will fail. Federal policy that encourages the university into a position of commitment toward the redefinition of goals and innovative transdisciplinary restructuring, without interfering in that process, is needed. As Jantsch points out

> ...the systemic multilevel coordination of educational structures beyond the teleological interdisciplinarity (mainly on the scientific-technical side of the system) and some limited experiments in normative interdisciplinarity has hardly been considered so far in the discussions centering around university reform--perhaps because a clear view of the (a) new purpose of the university is still lacking.[4]

Institutional Openness to Change

Certainly many institutions of higher education are not now and will not in the foreseeable future be interested in or ready for interdisciplinary or transdisciplinary approaches to academics. A climate of openness to goal redefinition and concomitant organizational innovation does exist, however, in many institutions involved in educational research and

4 Jantsch, 1970, Ibid. 3

research training. The existence of such a climate is a further assumption, necessary as a supplement to administrative commitment, if the grafting of an innovative model of interdisciplinary research training is to "take" at a given institution.

Such openness should not be inappropriately interpreted as being absent because of the existence of faculty negativism. Climate as used here is an attitudinal phenomenon based upon an underlying philosophy of education. Faculty negativism toward models of interdisciplinary study is often the result of professional and personal pragmatism. Certainly interdisciplinary research has a credibility gap with many of its most logical supporters (i.e. innovative faculty dedicated to the philosophical essentials of transdisciplinarity). The reasons for this in many cases can be traced to attempts at implementing such efforts in the past that have failed for lack of critical administrative support and organizational soundness. These failures have left committed faculty in inappropriate and awkward positions with regard to their disciplinary departments to whom they were dependent for academic and fiscal well-being. The resultant hesitancy to professionally commit to such efforts again is obvious and one of the most important arguments for a policy of organizational as well as conceptual soundness as a basis for initial federal support to interdisciplinary innovation.

Sensitivity to Social Process and Intellectual Reality

> Of a good leader, who talks little
> When his work is done, his task fulfilled,
> They will all say, "We did this ourselves."
>
> --Lao-tse

Administration cannot dictate the structure of interdisciplinary teamwork any more than it can dictate the direction of intellectual creativity. The former is as much a matter of professional freedom as is the latter. This is not to say, however, that the interdisciplinary organizational attitude should be entirely "laissez faire". Interdisciplinary teamwork is, like so much of human cooperation, a fragile thing at best, and a critical assumption of any organization that would portend to facilitate such efforts is its sensitivity to the need for creative social process. Such social orchestration is an art and a function of many factors, not the least of which is the personality(s) and social skills of those in positions of interdisciplinary leadership.

Flexibility

In a recent conversation with the administrator of an interdisciplinary research center, the discussion turned to the dimension of organization which he felt was most important to the success of his program. Without hesitation he said "a dedication to flexibility". By definition transdisciplinarity demands a state of continuous change. If the changing societal goals inherent in the concepts of trans-

disciplinarity are to be met, organizations facilitating them must be extremely dynamic, and the attitudes of the professionals involved must reflect acceptance of this lack of organizational stability.

Certainly this does not reflect the traditional nature of university structure, and maintaining such a state of continuous flexibility is difficult. No assumption is more critical, however, than that of longitudinal "non-structure" in organizations committed to facilitating interdisciplinary research -- indeed they must be dedicated to instability.

Pragmatic Sensitivity to Traditional Organizational Patterns

If the neophytic interdisciplinary organization is to be successful within the university, its leadership should be sensitive to the pragmatic need for complementary rather than competitive relationships with traditional departments. This is not to say that this will always be possible or that it will ever be easy. Most interdisciplinary units are atypical, and as Dressel (1972) points out, "atypical organizations are not easily geared into larger systems based on more traditional patterns". Creativity in management and organization is called for, however, and can be achieved if such interactive, complementary structuring is an administrative priority. The testing of organizational models against a criterion of such effectiveness would seem to be a high priority also for federally sponsored research into educational organization.

Communication

One further critical issue in the organization of training models designed to prepare researchers from varied disciplines to function in an integrated arena of educational research is communication. Semantic difficulties, educators' predilliction toward the over-use of jargon, and the more complex problem of differences in levels of abstraction and quantification form an iceberg on which many interdisciplinary efforts have foundered. Blackwell (1955) projects several clear sociological preventive measures to overcome these problems, including the attention to group process in staff seminars, providing time for the development of common understanding and the detailing of appropriate common axiomatics and glossaries.

In addition to these bases for effective communication an overall framework for the integrated approach to the problem under study is needed. This framework has most often been provided by aspects of systems science.

Careful study of what science means when disciplinary boundaries are removed is another important connector in the interdisciplinary communications matrix. The work of Churchmen (1971) and Singer (1969) are highly relevant here, but these points are eloquently put forth by Ian Mitroff and his colleagues and need no further amplification here.

Of most importance, however, are the attitudes and

interpersonal reactions of the professional members of the interdisciplinary team. The flow of ideas, opinions and reactions must be free and open. Professional egos, hidden agendas, personal insecurities and inappropriate demands for special status as a function of rank or special experience have been shown to reduce or eliminate such open communication. (Kolka, 1972) If this occurs, the potential for the integration of individual inputs or interdisciplinarity disappears.

APPROACHES TO ORGANIZATION

What are the present organizational models for interdisciplinary research and how far have they gone toward a transdisciplinary system? Clearly four types of interdisciplinary organization exist. The new colleges organized around contemporary social concerns no doubt go the farthest toward integrating traditional disciplines. Good examples of this approach would be the Green Bay campus of the University of Wisconsin and the University of California at Santa Cruz. At Green Bay the colleges have been organized around the socially relevant foci of environmental science, human biology, community sciences and creative communications.

These university structures are on the cutting edge of contemporary education. Interdisciplinary efforts are the primary not the peripheral emphasis of the institution. Organizations like these offer the greatest potential at the present time for transdisciplinary research and research training. Higher education is entering a period of

retrenchment, however, and the potential for establishing extensive numbers of new university communities like Green Bay or Santa Cruz in the immediate future would not appear to be great.

A second organizational format is the program or project organized as a part of one of the line organizational units (college or department) of the university. Here the interdisciplinary effort has the umbrella protection of the parent unit but also reaps the difficulty of limited autonomy and visibility. The long term impact of such organizations on the overall organization or interdisciplinary approach of the university is usually quite limited.

A third organizational approach to interdisciplinary study is the establishment of a line unit within the traditional university structure, that is developed to meet a particular interdisciplinary concern. Although the organization is traditional, disciplinary departments are usually absent. The organization is mainline, however, in that it is established to fit the existing fiscal and organizational fabric of the university. The faculty of such units often have joint appointments with more traditional academic units to maintain a more "basic" professional involvement and identity. Potential mobility and the concern for the long term stability of the more specialized units are most often the basis for such action.

A more important point, however, is that such interdis-

ciplinary organizational units are generally viewed by faculty and administrators alike as supplements or appendages to the "basic" structure of the university--the more traditional colleges and departments. At best there is partial support for their legitimacy and draw on the university's limited resources. Seldom is there anywhere near a university-wide commitment to the goals of the special college or department. At the same time, however, they do have a legitimate draw on the university budget and provide a relatively stable longitudinal organization.

The disadvantage of the traditional unit acting as a base for transdisciplinarity is, in fact, its organizational legitimacy. As a competitive member of the "budget club", it is difficult for such organizations to provide organizational counterpoints or to act as agencies for disciplinary integration.

The institute or center is perhaps the most prevalent university-based organization for interdisciplinary research and research training. This structure is somewhat similar to the special department or college but has the added flexibility of not being burdened with the traditional structure and/or organization. Most often responsible to a college dean and as often as not involved in instruction as well as research and/or service, the institute is generally not seen in the same light as a department. Its organization is extremely flexible, and it therefore meets the dynamic organizational demands of transdisciplinarity. It is expected

by definition to be atypical (for some purpose) and is generally accepted by faculty and administration alike as the most prevalent counter structure to the traditional disciplinary fabric of the university. Unfortunately, as indicated above, it also does not in most cases provide its administrator the luxury of line budgetary security.

It is interesting to note that of sixty-two scientific advances judged to be the most significant achievements made in social science between 1900 and 1965 twenty-seven were institute projects. (Deutsch, Platt and Stenghaas, 1971) At the same time the institute has come under continual attack as a proliferating counter agent within the university. It is seen as being out of the university main stream, often the result of inappropriate faculty entrepreneurship and generally "creating more problems than it solves". (Dressel, Johnson and Marcus, 1969)

Dressel and his colleagues do qualify their position, however, by indicating that the institution has proliferated,

> in great part, because of the fallibility of traditional academic departments whose instructional and research activities are tied tightly to the disciplines which justify their existence. Academic departments typically have neither the resources nor the interest to attack problems transcending their discipline; their faculty members are uncomfortable when asked to operate outside the theoretical constructs with which they are most familiar, and the rigidity of departmental compartments provides no easy way to bring together faculty members and resources from several disciplines. Thus, when funds become available in problem areas not previously established as being of university concern--or when the university is prodded into new concerns--the institute provides a natural vehicle for assembling staff, attracting more funds, indicating institu-

> tional commitment, and determining responsibility and accountability of resources.[5]

Stanley Ikenberry and Renee Friedman have recently written an extensive review and evaluation of the university institute that supports Dressel's qualifications. They comment that

> ... institutes tend to be organized around tasks that, in contrast to those of academic departments, may involve more than one discipline. This essential difference, although elementary, is at the root of the added flexibility provided by their organizational form. Few indications suggest that institutes will replace academic departments in the foreseeable future as the principal university organizational mode. Neither, however, is there evidence that demands for a task-oriented or mission-oriented posture on the part of universities will lessen. Thus, institutes are likely to continue to add a useful dimension to the overall organizational configuration. The issue is how institutes and centers can become more effective, better serve the purposes of the university as well as their own, and become more fully integrated in the life of the institution than they now are.[6]

The question Ikenberry and Friedman raise brings us back to Jantsch's (1970) conceptualization of transdisciplinarity. As we have discussed, he sees this as an integrated, systems oriented approach coupled with an integrated and dynamic goals system that brings the university more in sympathy with the contemporary needs of society. The author conceives the institute as the medium, the counterpoint within the traditional university organization

5 Dressel, Paul L., Johnson, F. Craig, and Marcus, Philip M., "The Proliferating Institutes", Change in Higher Education, July-August 1969, page 21

6 Ikenberry, Stanley O. and Friedman, Renee C., Beyond Academic Departments, Jossey-Bass Inc., 1972, page 4

for moving toward increasing transdisciplinarity.

If disciplines are to participate in the transdisciplinary structure, then they can do so only through commitment. To be meaningful, commitment should have budgetary as well as philosophical meaning. Just as individual professionals commit to interdisciplinary efforts through a joint effort of all members, numbers of departments can band together through a neutral organization to provide interdisciplinary leverage in a given area. Organizationally this requires a facilitating, flexible agency to act as an organizational "referee". Such a unit cannot be a budgetary competitor in the line structure and maintain its credibility as a neutral. This role can be filled well by the institute if it is organized with this in mind. The Institute for Family and Child Study at Michigan State University is such a unit. (Boger, 1970)

All of this assumes again that the university is to a degree Baconian in its orientation. It also assumes, however, that the functional and critical nature of disciplinary structure must be protected. What is called for are complementary structures to expedite transdisciplinarity as a supplement to disciplinary functioning.

SUMMARY

This paper has been an attempt to pose some of the issues of organizational policy facing the university and its supporting agencies as it attempts to meet the problems of contemporary society, particularly as these problems focus upon educational research and research training and demand interdisciplinarity in the process of their solution. Several points in this discussion seem focal, and for purposes of clarity they are summarized as follows:

1) Any definition of interdisciplinarity leads to a model that necessitates an integration of some structure of goals with a system for integrating participating disciplines. Erich Jantsch (1970) formulated a model for such an interdisciplinary effort on the part of the university which he defines as the development of transdisciplinarity.

2) If any such transdisciplinary innovation within the university is to be successful, it necessitates certain operational assumptions which include philosophical and budgetary commitment at the highest level of university administration; a university climate which is open to change; a sensitivity to the social process demands of interdisciplinary efforts by those who would lead them; a dedication to flexibility and a state of continual instability on the part of the agency facilitating the university's interdisciplinary thrust; a well developed definitional, attitudinal

and procedural structure for expediting interdisciplinary communication; and most of all a pragmatic sensitivity to the need for creative, pragmatic approaches to interdisciplinary innovation that complement rather than compete with important traditional organizational structure at the university.

3) Four organizational patterns are often employed in the establishment of interdisciplinarity at the university. They include a) the transdisciplinary university, b) the traditional line unit (college and/or department) of the university, c) a sub-program within such a unit and d) the institute or center.

4) The institute is seen as the most creative organizational structure for the innovative development of transdisciplinarity in the university because its atypical format allows it to flexibly meet the critical assumptions previously noted, and its position outside the budgetary line structure of the university allows it to assume the neutral role of transdisciplinary expediter for participating disciplinary units.

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APPENDIX A

Continuum of Types of Research Undertakings

$X_1Y_1Z_1$	$X_1Y_1Z_n$	$X_nY_1Z_1$	$X_nY_nZ_1$	$X_nY_1Z_n$	$X_nY_nZ_n$
Lone researcher working in one discipline	Lone researcher using more than one discipline	Two or more researchers working separately in same discipline	Two or more researchers working as a team in same discipline	Two or more researchers working separately in different disciplines	Multidisciplinary team research

Let X represent the number of researchers (X_1 = one person; X_n = more than one person). Let Y represent the kind of action in the research process (Y_1 = separate action; Y_n = varying degrees of collective action). And let Z represent the number of disciplines (Z_1 = one discipline; Z_n = more than one discipline). It is obvious that these dimensions may be arranged in eight possible combinations. Two of these combinations would require <u>one</u> person in <u>collective</u> action which is impossible. The remaining six combinations of these dimensions may be placed on a descriptive continuum of research as illustrated in the accompanying chart.

Blackwell, Gordon W., "Multidisciplinary Team Research", <u>Social Forces</u>, Vol. 33 (May, 1955) pp 367-368